



Department of Energy - Office of Science

DOE Atmospheric Science Program

Progress Report on Aerosol Radiative Forcing of Climate

BERAC Meeting

April 20, 2005

Peter Lunn

Program Director for Atmospheric Science



Program Goals and Focus

Long-Term Goal --- developing comprehensive understanding and representation of the atmospheric processes that control the transport, transformation, and fate of energy related trace chemicals and particulate matter.

Focus --- aerosol radiative forcing of climate, i.e., aerosol chemical, microphysical, and optical properties, including their geographical and vertical distribution and the rates and mechanisms of their evolution:

1. Sources of particles and gaseous precursors
2. Transport of particles and gaseous precursors, local-to-regional scales with scientific and programmatic connections to larger scales
3. Concentrations of gas-phase aerosol precursors
4. Characterization of aerosol properties
5. Aerosol transformations
6. Atmospheric radiation (characterization of aerosol influences)



BERAC Report

Research
Announcement

Science Team

Deliverables

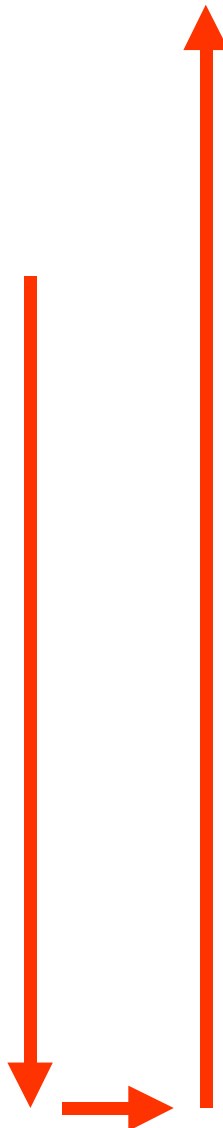
Partnerships

Field Campaigns

Working Groups

Science Steering
Committee

Science Team Meeting





Science Team

- Aerodyne
- Argonne
- Boston College
- Brookhaven
- Cal Tech
- Desert Research Inst.
- [EPRI](#)
- [Los Alamos](#)
- Lawrence Berkeley
- Livermore
- MIT
- NASA Langley
- NCAR
- NOAA CMDL
- [NRL](#)
- [ORNL](#)
- PNNL
- [SUNY Albany](#)
- SUNY Old Westbury
- [TropoChem](#)
- UC Irvine
- UCLA
- UC Riverside
- U Colorado
- [U Miami](#)
- U Minnesota



Science Steering Committee

Peter H. Daum

J. Christopher Doran

Jeffrey S. Gaffney

Steven J. Ghan

Chris A. Hostetler

Sasha Madronich

Luisa T. Molina

John H. Seinfeld

Brookhaven

PNNL

Argonne

PNNL

NASA Langley

NCAR

MIT

Cal Tech

Chairman and Chief Scientist: Stephen E. Schwartz Brookhaven



Working Groups

- Instrument Development
- Laboratory Studies
- Field Studies
- Model Development and Evaluation

- Gas-Particle Interaction
- New Particle Formation
- Aerosol Optical Properties
- Cloud-Aerosol Interactions

- MASE 2005
- MAX-Mex 2006
- Houston 2006
- St. Louis 2007



Field Campaigns

MASE: MArine Stratus Experiment

MAX-Mex: Megacity Aerosol eXperiment – Mexico City

Houston 2006 and St. Louis 2007 Under Consideration





MASE



July 2005 @ Point Reyes, California

Aerosols and Marine Stratus Clouds.

Indirect Aerosol Effects.

Cooling.

Very Large Uncertainties.

Connections between aerosol loading and reflectivity.

Connections between aerosol properties and precipitation.

Ground-based Measurements.

G-1 and Twin Otter Airborne Measurements.



MAX - Mex

February-March 2006 @ Mexico City

Megacity Aerosol Exportation to the Global Environment.
Characterize the Chemical, Physical, and Optical Properties
of Aerosols from a Megacity Source and the Production of SOAs
and Inorganic Aerosols.

Evaluate the Rates and Yields of both Primary Particle Aging
and Secondary Aerosol Conversions from a Megacity.

Extensive Ground-based Measurements.

G-1, Lear Jet, C-130 (NSF), and DC-8 (NASA) Airborne Measurements.



Partnerships

ARM

MASE – AMF Deployment

NRL and Cal Tech

MASE – CIRPAS Aircraft

NASA Langley

Cost Sharing and NASA Aircraft

NSF MIRAGE-2006 and Molinas' MCMA-2006

NARSTO

Coordination and Data Archiving

CCPP

Incorporation of Models and Parameterizations
developed by ASP



Program Deliverables

Models and parameterizations that effectively represent aerosol properties and processes required to compute aerosol radiative forcing of climate in large-scale climate models, together with an assessment of their accuracy and limitations.

- Relating aerosol light scattering and absorption, including dependence on relative humidity and other controlling variables, to aerosol chemical and microphysical properties.
- Relating cloud microphysical properties and dependence on controlling variables, to concentration, and chemical and microphysical properties of pre-cloud aerosol.
- Relating evolution of aerosol composition and microphysical properties, and optical and cloud nucleating properties, to concentrations of precursor gases, properties of the pre-existing aerosol, cloud processing, and other controlling variables.



Program Website

www.asp.bnl.gov

- Presentations from the January 2005 Science Team Meeting
- Scientific and logistical details of planned field campaigns